EMRAS WORKING GROUP 8
PIACENZA, 1-2.07.2010

COASTAL MARINE REGIONS
PRELIMINARY RESULTS

Mikhail Iosjpe
Norwegian Radiation Protection Authority

Statens strålevern
Norwegian Radiation Protection Authority

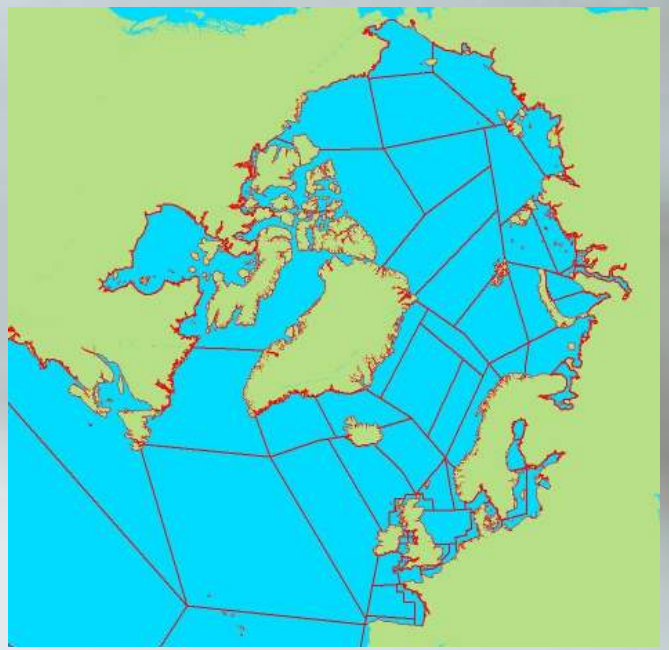
Scenario (I)

- A single deposition of 1000 Bq/m^2

  radionuclides: ^{137}Cs, ^{90}Sr, ^{131}I

  and ^{239}Pu;

  all marine regions (global fallout)



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Scenario (II)

- **Age**

  adult, 10-year old and 1-year old
- **Time**

  1st year, 2nd year and 10th year after releases
- **Seafood**

  fish, molluscs, crustaceans and seaweeds

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Scenario (III): regions

Name	Volume, m^3	Depth, m	Surface area, m^2
Irish Sea: Cumbrian Waters	3,80E+10	2,80E+01	1,36E+09
English Channel: Lyme Bay	2,01E+11	3,95E+01	5,09E+09
North Sea: Norwegian Current Surface	9,20E+12	1,56E+02	5,90E+10
Skagerrak	6,78E+12	2,10E+02	3,23E+10
Baltic Sea: Gulf of Riga	4,05E+11	2,30E+01	1,76E+10
Kara Sea: Ob Bay	3,19E+11	1,10E+01	2,90E+10

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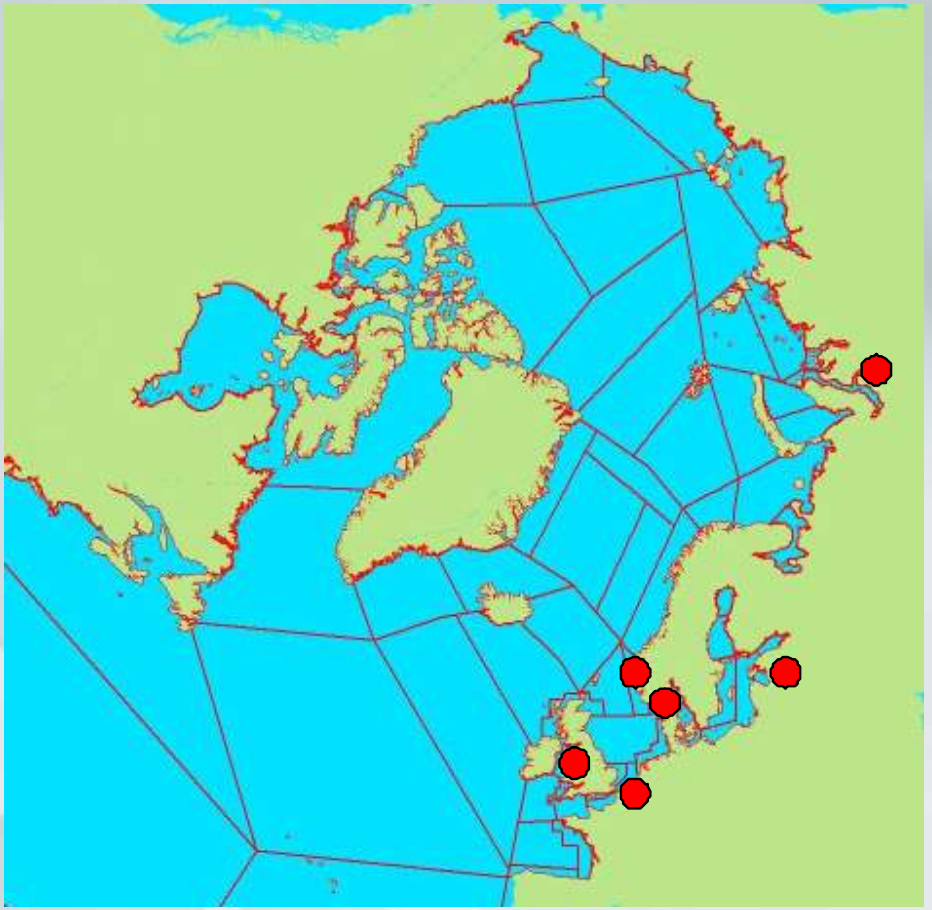
Scenario (IV): regions



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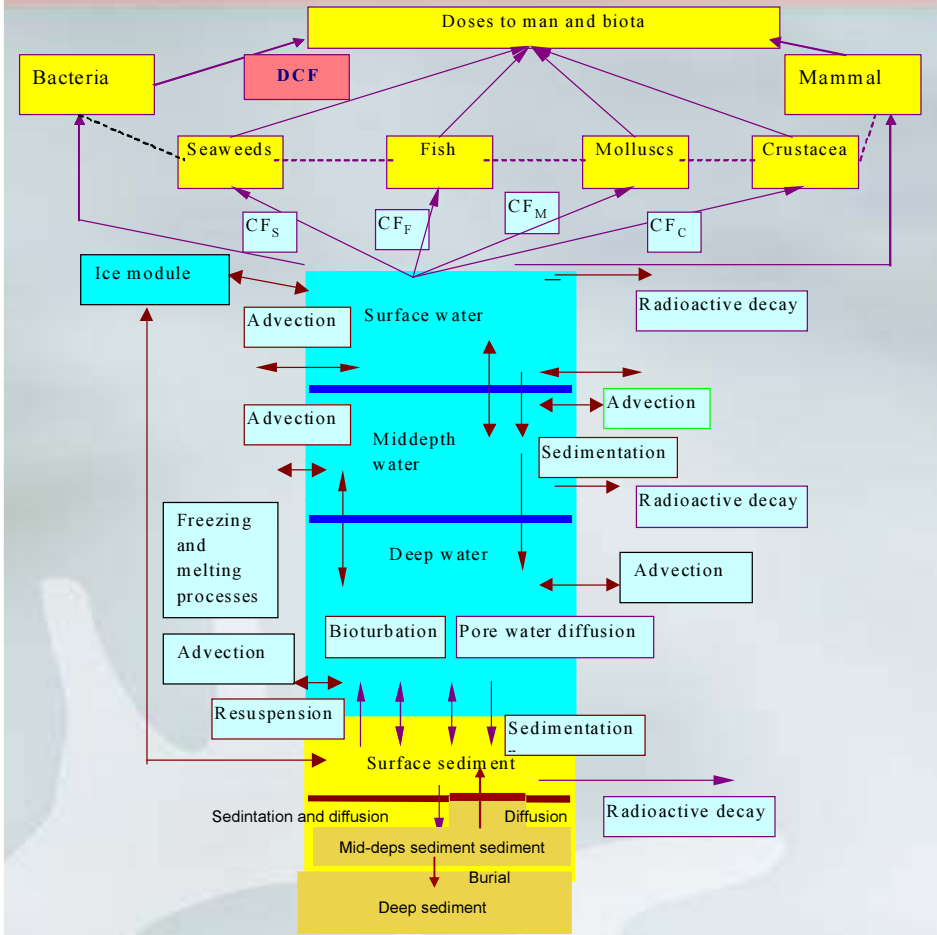
Modelling approach



Radionuclides can be present in three phases: dissolved, suspended matter particles and bottom sediment

The structure of the compartments for surface, mid-depth and deep waters is developed with regards to the improved description of Polar, Atlantic and Deep waters in the Arctic Ocean and the Northern Seas (Karcher & Harms, 2000) and site-specific information for description of the compartments (the 3D NAOSIM model, AWI).

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Parameters: *SSL* (suspended sediment load) and *SR* (the mass sedimentation rate)

Name	SSL t/m^3	SR, t/m^2/y
Irish Sea: Cumbrian Waters	1,0E-05	6,0E-03
English Channel: Lyme Bay	3,0E-06	1,0E-04
North Sea: Norwegian Current Surface	6,6E-06	1,0E-04
Skagerrak	1,0E-06	5,0E-03
Baltic Sea: Gulf of Riga	1,0E-06	5,0E-04
Kara Sea: Ob Bay	5,0E-05	1,0E-03

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Parameters: sediment concentration factor (k_d) (IAEA, 2004).

Radionuclide	k_d
Cs-137	4000
Sr-90	8
I-131	70
Pu-239	10000

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Seafood consumption (Smith & Jones, 2003)

	Group 1 (adult)	Group 2 (child)	Group 3 (infant)
Fish	51	10.2	2.5
Crustacean	17	2.25	0
Molluscs	14	3.5	0
Seaweeds	5	0	0

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Dose coefficients (Sv/Bq) (ICRP, 1996)

	Cs-137	Sr-90	I-131	Pu-239
1-year	1.20E-08	7.30E-08	1.80E-07	4. 20E-07
10-year	1.00E-08	6.00E-08	5.20E-08	2. 70E-07
Adult	1.30E-08	2.80E-08	2.20E-08	2. 50E-07

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Concentration factors (IAEA, 204)

	Cs-137	Sr-90	I-131	Pu-239
Fish	1E+2	3E+0	9E+0	1E+2
Crustacean	5E+1	5E+0	3E+0	2E+2
Molluscs	6E+1	1E+1	1E+1	3E+3
Seaweeds	5E+1	1E+1	1E+4	4E+3

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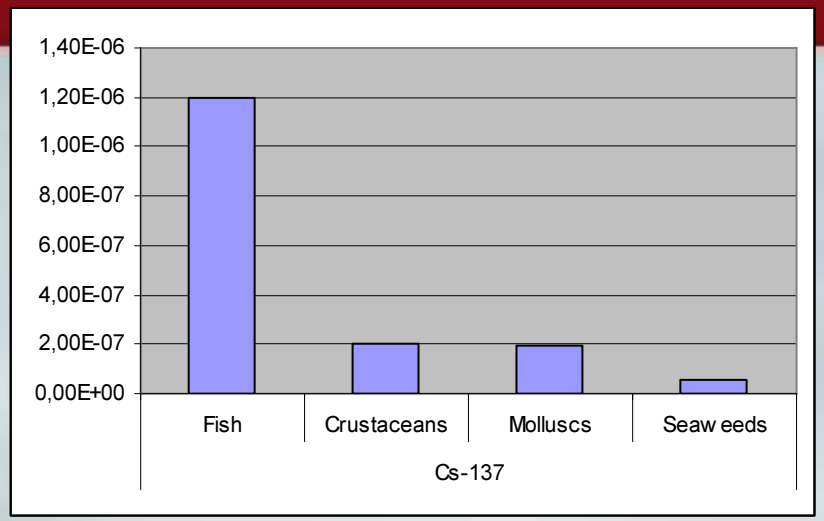
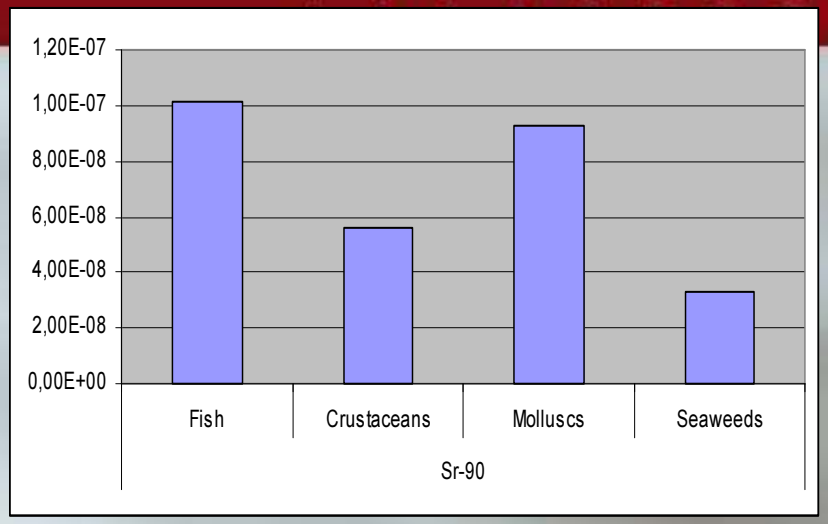
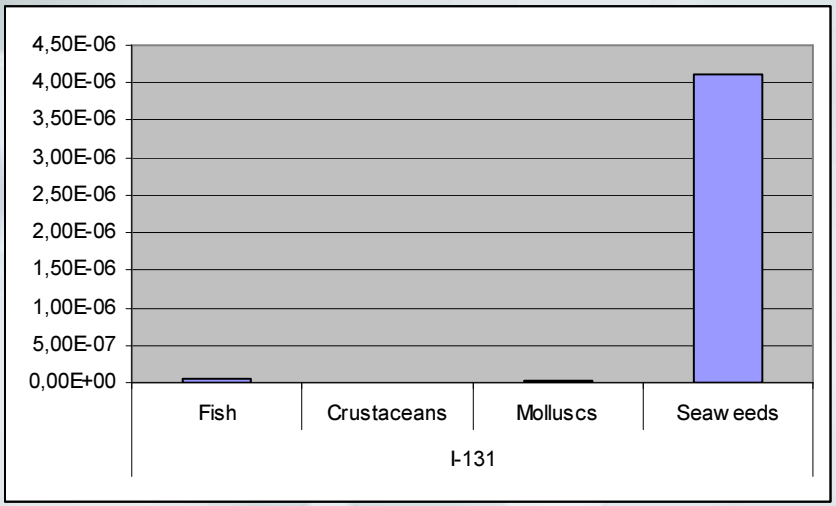
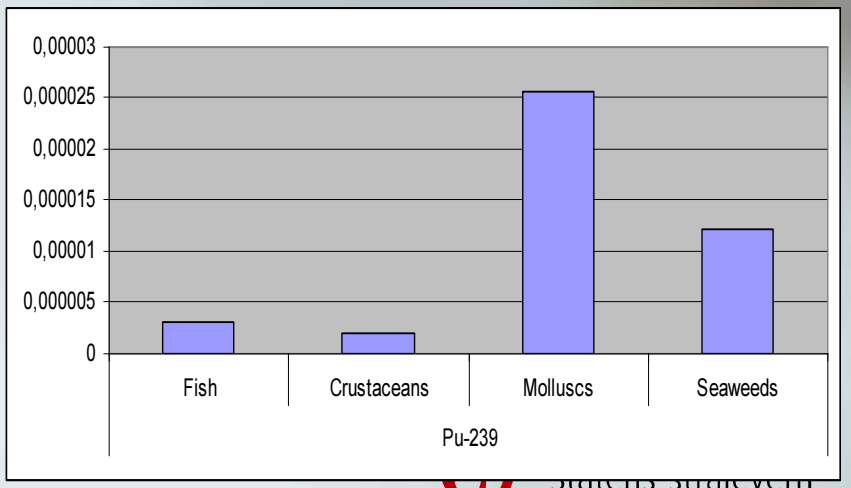
Results: seafood dose impact to adult (Cumbrian Waters)









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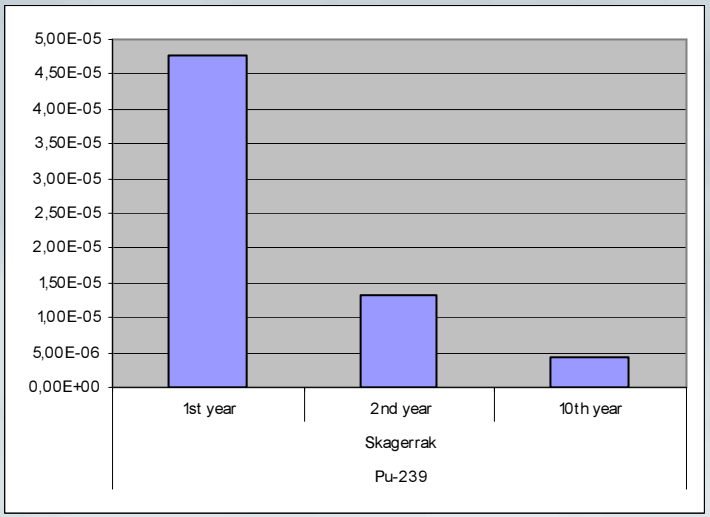
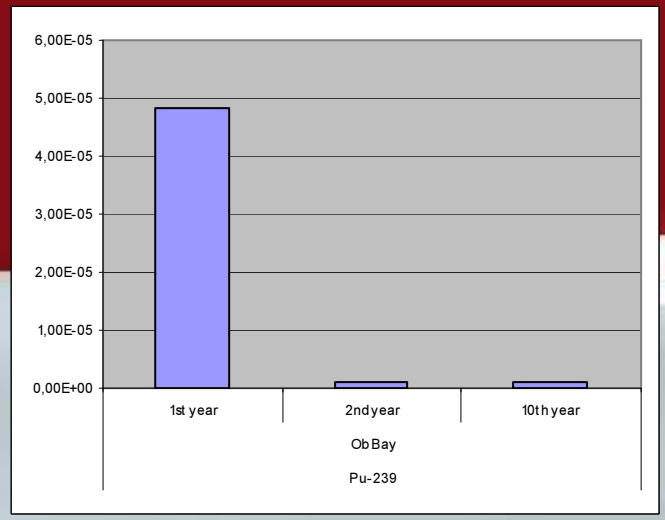
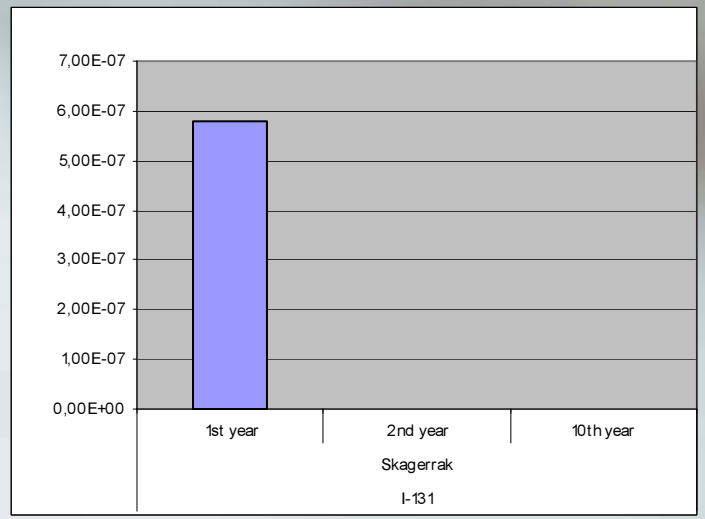
Results: time







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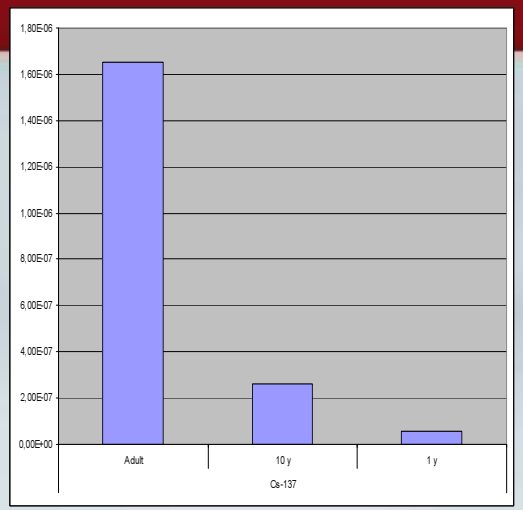
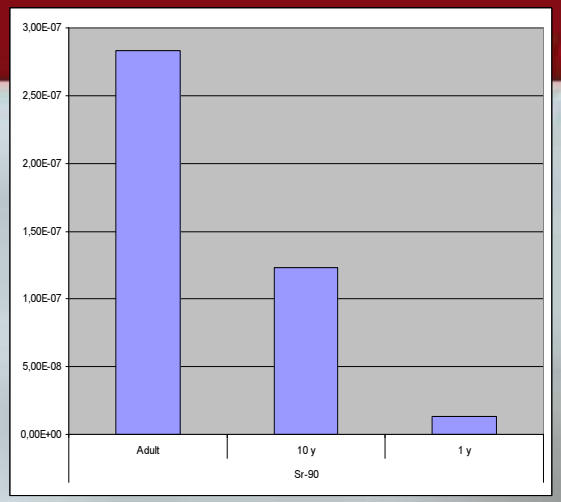
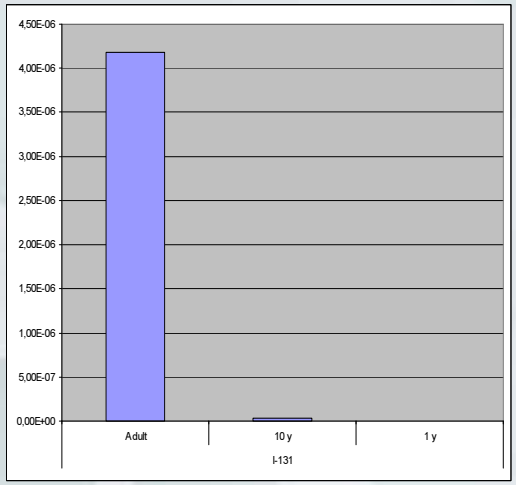
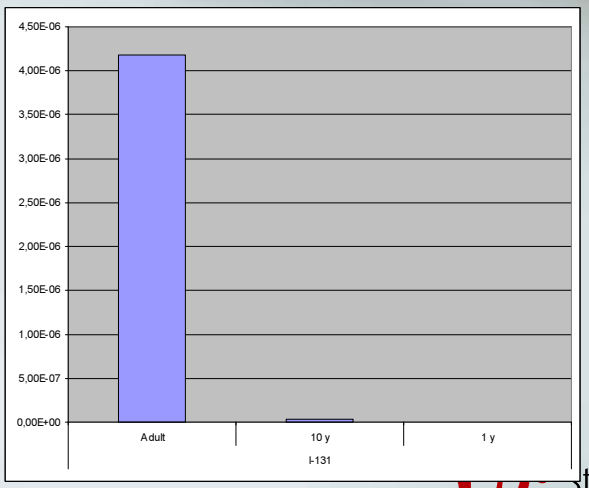
Results: age (Cumbrian waters)









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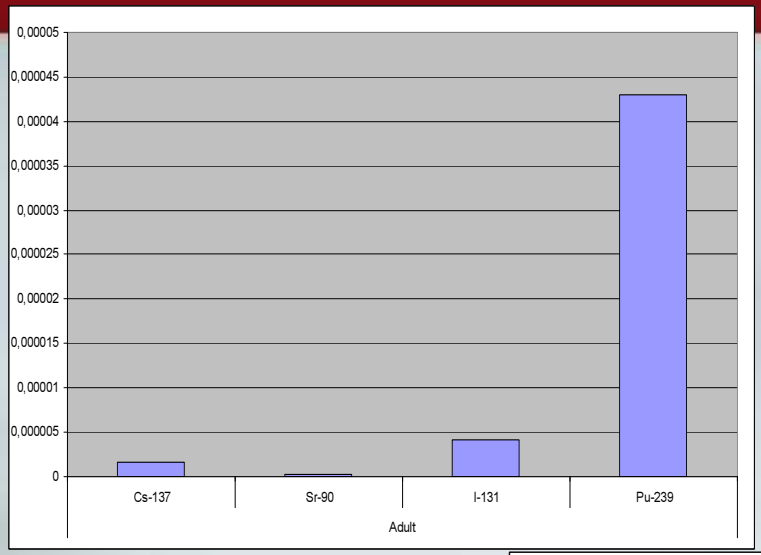
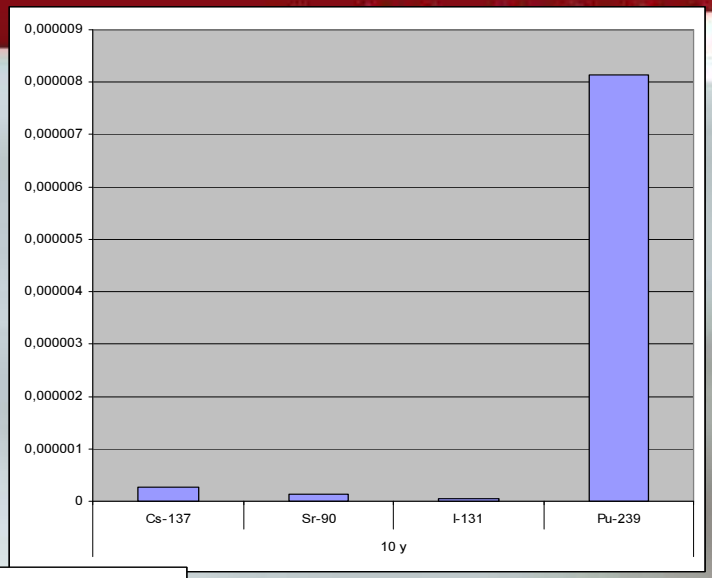
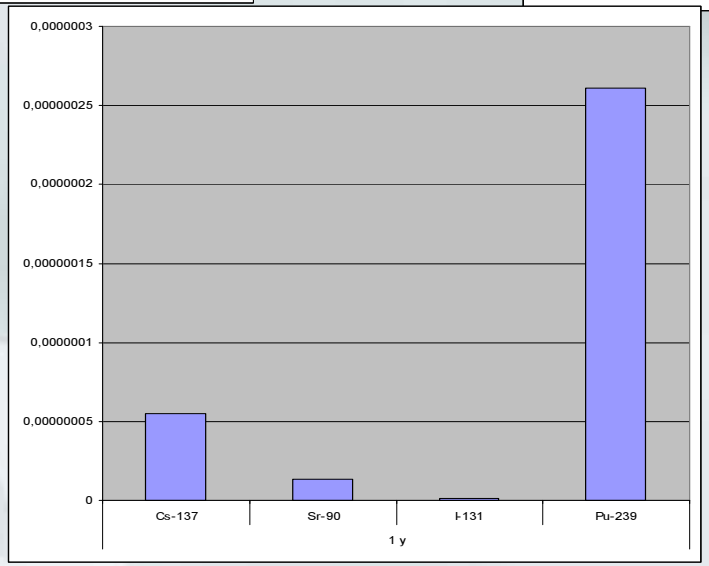
Results: impact of raionuclides







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Doses to man during the first year, Sv/y

	Cs-137			Sr-90			I-131			Pu-239		
	Adult	**10 y**	**1 y**	**Adult**	**10 y**	**1 y**	**Adult**	**10 y**	**1 y**	**Adult**	**10 y**	**1 y**
Irish Sea: Cumbrian Waters	1.65E-6	2.60E-7	5.52E-8	2.83E-7	**1.23E-7**	1.32E-8	4.2E-6	3.79E-8	1.47E-9	4.30E-5	8.1E-6	2.61e-7
English Channel: Lyme Bay	9.45E-7	1.49E-7	7.62E-9	1.32E-7	**5.72E-8**	6.13E-9	2.9E-6	2.40E-8	9.27E-10	6.75E-5	1.3E-5	4.10e-7
North Sea: Norwegian Current Surface	6.16E-7	9.70E-8	2.06E-8	8.72E-8	**3.79E-8**	4.07E-9	7.6E-7	7.20E-9	2.80E-10	1.23E-5	2.3E-6	7.49e-8
Skagerrak	8.77E-7	1.38E-7	2.93E-8	1.28E-7	**5.55E-8**	5.95E-9	5.8E-7	6.45E-9	2.53E-10	4.76E-5	9.0E-6	2.89e-7
Baltic Sea: Gulf of Riga	2.58E-6	4.06E-7	8.62E-8	4.22E-7	**1.84E-7**	1.98E-8	5.1E-6	4,54E-8	1.76E-9		1.8E-5	5.67e-7
Kara Sea: Ob Bay	2.86E-6	4.51E-7	9.57E-8	5.09E-7	**2.21E-7**	2.37E-8	1.1E-5	9.07E-8	5.27E-8	4.83E-5	9.1E-6	2.93E-7

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